

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. **(Currently Amended):** ~~A theorem-proving decision support system using a method of providing a decision result to a user~~~~decision making by an expert in the absence of clearly identifiable rules, the method executing on a computer and comprising the steps of:~~

~~establishing-generating~~ decision making rules by the computer system, based on a standard decision tree in the absence of clearly identifiable rules, the rules comprising at least two variables for each of which at least one limit is not strict;

~~questioning-the-receiving on the computer system input from an expert on a set of singular points of compensation belonging to a boundary between two zones for one of which the compensation is not clearly expressed;~~

introducing compensation rules in the decision tree;

fuzzyfying the compensation rules;~~and;~~

deducing the ~~values~~values of a ~~of the~~ set of rules used to deduce the decision;  
and

outputting a decision result to a user.

2. **(Previously Presented):** The method as claimed in claim 1, wherein the compensation either holds or does not hold, and that there is just one single compensation boundary.

3. **(Previously Presented):** The method as claimed in claim 1, wherein the conditions in the premises are rendered fuzzy by the expert, that the compensation may

hold to a greater or lesser extent, that there are two compensation boundaries, that the application of the rules makes it possible to calculate a degree of possibility regarding the set of possible alternatives, and that the system one must interpret the final distributions of possibility so as to deduce the decision therefrom.

4. (Previously Presented): The method as claimed in claim 1, wherein the compensation condition is written as the aggregation by a simple unweighted sum of utility functions on each variable, that the utility functions are piecewise affine, that an the expert provides an abscissa of the points delimiting the affine parts, and that parameters of the compensation condition are ordinates of these points.

5. (Previously Presented): The method as claimed in claim 4, wherein the expert provides in relative terms with respect to extreme values the ordinates of the utility functions for all points delimiting the affine parts except for two extreme points and threshold, that the utility at the threshold is zero and that the parameters of the compensation condition are the ordinates of the utility functions for the extreme points.

6. (Previously Presented): The method as claimed in claim 4, wherein the utility at the threshold is zero and that the parameters of the compensation condition are the ordinates of the utility functions for all points delimiting the affine parts except for the threshold.

7. (Previously Presented): The method as claimed in claim 5, wherein the particular points are such that all their coordinates according to the variables except one are equal to one of the values delimiting the affine parts of the utility functions, that the system one requests the expert to provide the value according to the nonfixed coordinate so that the particular point is situated exactly on a compensation boundary, that the system one determines a characteristic point for every variable and every value delimiting the affine parts of the utility function on this variable such that the coordinate of the characteristic point along the variable is equal to the value and such that the

ordinate of this value is a parameter, that the relations that one has on the characteristic points culminate in a set of system equations whose unknowns are the parameters, and that the system solves this set with a suitable classical procedure.

8. (Previously Presented): The method as claimed in claim 7, wherein the expert determines for each variable the type of compensation to which it belongs, that this provides a set of equations and of inequalities, that it is necessary to append the equations arising from the characteristic points, and that the system one solves this system according to a classical procedure.

9. (Previously Presented): The method as claimed in claim 7, wherein all the variables correspond to a compensation of the type for which, for each variable  $R_i$ , there exists a value of  $R_i$  above or below which no more compensation is possible regardless of the value according to the other variables, that the expert provides as relative values with respect to the extreme values the ordinates of the utility functions for all points delimiting the affine parts except for the two extreme points and the threshold, that the utility of the threshold is zero, that the parameters of the compensation condition are the ordinates of the utility functions for the extreme points, that fuzziness is introduced, that the conditions in the premises are rendered fuzzy by the expert, that the compensation may hold to a greater or lesser extent, that the characteristic points are such that the component along a well-satisfied variable corresponds to the maximum value along this variable, that the component along a poorly satisfied variable is free, that the system one asks the expert to provide the value along the free coordinate so that the particular point is situated exactly on a compensation boundary and that all the other components are fixed at the thresholds.

10. (Previously Presented): The method as claimed in claim 1, wherein the rule base corresponds to a decision tree.

11. (Previously Presented): The method as claimed in claim 3, wherein the rule base corresponds to a decision tree, and that a single alternative may be entirely possible in the final distribution of possibilities.

12. (Previously Presented): The method as claimed in claim 11, wherein the system one reveals in the decision tree the pairs of complementary conditions, including the compensation conditions, that the system one processes the complementary conditions at the same time while separating the kernel of their fuzzy set by a very small number.

13. (Previously Presented): The method as claimed in claim 11, wherein the system one commences by formally introducing compensation, then that the system one formally introduces fuzziness, then that the system one specifies the noncompensatory fuzzy conditions, and finally that the system one specifies the compensatory fuzzy conditions.

14. (Previously Presented): The method as claimed in claim 2, wherein the compensation condition is written as the aggregation by a simple unweighted sum of utility functions on each variable, that the utility functions are piecewise affine, that an the expert provides the abscissa of the points delimiting the affine parts, and that the parameters of the compensation condition are the ordinates of these points.

15. (Previously Presented): The method as claimed in claim 3, wherein the compensation condition is written as the aggregation by a simple unweighted sum of utility functions on each variable, that the utility functions are piecewise affine, that an the expert provides the abscissa of the points delimiting the affine parts, and that the parameters of the compensation condition are the ordinates of these points.

16. (Previously Presented): The method as claimed in claim 6, wherein the particular points are such that all their coordinates according to the variables except one

are equal to one of the values delimiting the affine parts of the utility functions, that the system one requests the expert to provide the value according to the nonfixed coordinate so that the particular point is situated exactly on a compensation boundary, that the system one determines a characteristic point for every variable and every value delimiting the affine parts of the utility function on this variable such that the coordinate of the characteristic point along the variable is equal to the value and such that the ordinate of this value is a parameter, that the relations that one has on the characteristic points culminate in a set of system equations whose unknowns are the parameters, and that the system solves this set with a suitable classical procedure.

17. (Previously Presented): The method as claimed in claim 12, wherein the system one commences by formally introducing compensation, then that the system one formally introduces fuzziness, then that the system one specifies the noncompensatory fuzzy conditions, and finally that the system one specifies the compensatory fuzzy conditions.

18. (Previously Presented): The method as claimed in claim 1, wherein strict is where conditions on the variable value thresholds may be violated.

19. **(Currently Amended):** A theorem proving decision support system ~~using a method of decision making by an expert system in the absence of clearly identifiable rules,~~ the method comprising the steps of:

establishing on a computer system decision making rules by the system in the absence of clearly identifiable rules, the rules comprising at least two variables for each of which at least one limit is not strict where conditions on variable value thresholds may be violated;

formulating questions, the answers to which enable asking questions for allowing the system to introduce a compensation condition for the parameters of a decision tree wherein a poor value of a first variable is compensated by a good value of another variable;

outputting the questions to an expert;

receiving the answers to the questions and determining for each parameter of a compensatory condition, at least one particular point belonging to a compensation boundary connected with the parameter;

deducing the value of the parameters for the set of rules used to deduce the decision; ~~and;~~

~~deducing~~ determining a decision from the set of rules; and

outputting the determined decision to a user.